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VIII. *Observations upon the Seeds of Plants.* By  
 the same. Translated by John Chamberlayne,  
*Efq;*

*Delft in Holland, 27. June, 1721.*

I Have often turn'd my Thoughts to the observing the so called Membranes, in which the Substance of Meal, or Flower, is inclosed, like little Packets in Cells or Boxes, which is also the case of all kinds of Beans, Pease, Wheat, Barley and other Grain. I at length, with astonishment, discover'd very plainly, that what I call the Membranes, were endued with an unspeakable number of little Holes, thro' which, in many places, one might perceive the Light ; which Holes we must suppose to be nothing else but little Vessels, which had been torn or cut off, and which do partly compose the Membranes, which I call Little Cells, and which partly serve for the Production of the *Farina*, of which there are an infinite number of Particles in a Pea or Bean ; which, as small as they are, I imagine that each of those mealy Particles receives its increase from a little Vessel, which proceeds from the foresaid Cell, and that those Vessels are imperceptible through their Smallness.

These Vessels, of which the little Cells, or Cases, do mostly consist, are more easy to be discover'd in Beans and Pease, than in any sort of Legumens or Grains ; but in Wheat the Vessels are difficultly trac'd

ced in the Cells, and I have been obliged to make very many Observations and Experiments, before I could fully satisfy my self, that I saw the torn or broken Vessels ; the Reason of which is, that the little Vessels, of which the Cells or Skins of the Grains of Wheat are composed, are exceeding thin and brittle.

Moreover, I have found, upon observing the Vessels, of which the Cells are composed, that several of the Globules in Wheat were broken in pieces in the Operation, and that in one of those single Globules, there were other small Globules enclosed.

I have likewise observed that the Membranes, or little Cells, in *Barley*, in which the Globules, or Parcels of the Meal are shut up, and receive their increase, are thicker and stronger than those of *Wheat*.

Although I conclude, that almost all Seeds and Grains, as well as their Membranes, or Skins, are of one and the same Texture and Configuration, yet for Experiment sake, I took a large *Almond*, and cut off several thin Slices from it, and dug out of those Slices, as well as I could, the Substance that lay in the little Cells, and viewing them, as nicely as possible, with a Microscope, I observed that those Cells, in which the Oyl of the said *Almond* was for the most part contain'd, consisted also of nothing but little Vessels.

My Intentions were indeed, if it had been practicable, to view the smaller sorts of Seeds, in order to find out, whether the little Cells, in which the *farinaceous* matter might lie, were likewise composed of small Vessels : but I changed my mind, believing

that my Endeavours therein would be ineffectual, by reason of the Smallness of those little Cells, and consequently of the Vessels, of which those Cells were made up, though I do not question but what we discover in the greater Seeds, is analogous to the Structure of the small ones.

Now when I perceiv'd, that the before-mention'd little Cells proceeded from the Bark, or Skin, which surrounds the Kernel of the Seed, or Grain, I was thinking that, as the mealy Substance receives its increase from the Vessels, which are in the little Cells, and as the Plant is formed between the Cells, during the time that the Seed lies in the Earth, and as the little Orifices in the Skin of Animals and Fruits, are formed in order to discharge thereby the Superfluity of their Moisture, and do shut in such a manner, that no Moisture, nor common Air, can get into the same, as I have formerly advanced : So on the contrary, the Orifices of Seeds are so form'd, that many of their little Vessels do admit Moisture to pass inwards, and accordingly Water is driven into them by the pressure of the Air, and causes the Seed to swell; upon which, a Warmth and Fermentation succeeding in the Seed, it requires a greater space, and by the particular Formation of the Particles, which lie in the Cells, and which have derived their Increase from the Cells, the mealy Substance, of which they consist, is partly driven out of them into the body of the young Plant, which by this means increases so much in bulk, that the Root is now able to supply it with Nourishment from the Earth, at which time the Seed is found to be diminished in its bigness.

As often as I have view'd Seeds, for several Years past, with the Microscope, yet I never imagin'd, that the little Cells were endued with so many Vessels, tho' I have often been considering, how the Intrusion of the Particles of the Meal, or Flower, into the Membranes was effected ; nor should I ever have attained thereto, but by continual Labour in the investigation of things, which are concealed from our naked Eyes, and towards which I have a much greater inclination, than what I observe in most other Men.

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